



## **Earthquake imprints on seafloor sediments in Northern Ireland, UK: 3D characterisation of Soft Sediment Deformation (SSD).**

Marine Laborde (1,2), Catherine Homberg (1,2), Johann Schnyder (1,2), Rob Raine (3), and Dermot Smyth (4)  
(1) UPMC, Paris 6, Institut des sciences de la terre de Paris (ISTeP), Paris, France, (2) CNRS, UMR 7193, ISTeP, F-75005, Paris, France, (3) Geological Survey of Northern Ireland, Dundonald House, Upper Newtownards Road, BT4 3SB, Belfast, Northern Ireland, (4) LONMIN (Northern Ireland) Limited, 6 Plasketts Close, Kilbegs Road, Antrim, Northern Ireland

The Penarth Group deposits (Rhaetian, Triassic–Jurassic boundary) in Northern Ireland are characteristic of lagoonal and shallow marine environments. Despite the likely absence of significant slopes, these formations are affected by episodic and intense re-sedimentation events, revealed by prominent soft sediment deformation. This study aims to characterise the origin and mechanisms of these deformation events that occurred before the lithification of the sediment, when it was only slightly indurated and still waterlogged. In this study we examine evidence from four on-shore cores and one outcrop within two separate basins c. 80 km apart (Larne Basin and Rathlin Basin). Facies correlations within the Westbury Formation and the Langport Formation (Cotham Member) between the five logged sections allow identification of at least two distinct periods of liquefaction within the Penarth Group. The soft sediment deformations observed in Northern Ireland are characterised by the presence of numerous centimetre- to decimetre-scale convolute bedding, slumps, isoclinally folded cross bedding, loading and diapirism. In core, small-scale normal syn-sedimentary faults, with offsets of a few millimetres to a few centimetres are responsible for the development of small grabens. Rose diagrams of fold axes and fault strikes in all studied sections show a NW-SE preferred orientation, indicating a strong tectonic control. Located on the foreshore, the outcrop at Waterloo allows 3D characterisation of the structures, of which the size and shape appear to be dependent on a variety of parameters such as particle size, the shear strength of the material and the thickness of the layer. We propose that deformation of seafloor deposits was generated by a succession of earthquakes within an extensional tectonic regime during the Early Mesozoic and we discuss the respective contribution of the above mentioned control parameters on the deformation of surface and subsurface sediments.